

## REMARKS

The following remarks are offered in complete response to the Official Action/Election of Species Requirement dated May 5, 2008. Applicants respectfully request entry of the foregoing and reconsideration of the subject matter identified in caption, as amended, pursuant to and consistent with 37 C.F.R. §1.112, and in light of the remarks which follow.

Claims 15-26 are pending in this application.

Claim 15 has been amended to replace "derivatives" with "compounds"; to recite that the compounds are synthesized from an alkylthiolate, to better recite the process of step a), to delete a comma to improve readability of the claim, and to correct the format regarding the recitation of the solvent used in step a) which was inadvertently changed in the previous amendment. Support for this amendment is found in the specification on page 6, line 36 - page 7, line 20. Claim 16 has been amended to replace "aqueous medium" with "solvent". Support for this amendment is found in the specification on page 4, lines 18-22. Claim 20 has been amended to depend from Claim 19. No new matter has been added in making these amendments.

Applicants gratefully acknowledge the Examiner's decision to withdraw the Election of Species requirement.

### Claim Objections

Claim 20 is objected to as being in improper form as a multiple dependent claim.

Claim 20 has been amended to depend from claim 19. Applicants therefore request the withdrawal of this objection

**35 U.S.C. §112 first paragraph**

Claims 15-26 have been rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

The Office Action states that Claim 1 recites the limitation "derivatives" but the specification does not provide guidance or descriptions drawn to the "derivatives."

Applicants believe the reference in the Office Action to Claim 1 was meant to refer to Claim 15, as Claim 1 had previously been cancelled and Claim 15 recites the term in question. Claim 15 has been amended to recite "A process for the synthesis of compounds having a hydrofluoromethylenesulfonyl radical from an alkyl thiolate ". The claimed process converts an alkylthiolate to a compound having a hydrofluoromethylenesulfonyl radical by reacting the alkylthiolate with a compound exhibiting a carbon of  $sp^3$  hybridization carrying a hydrogen, a fluorine, a heavy halogen, selected from the group consisting of chlorine, bromine and iodine, and an electron-withdrawing group which is fluorine or a group having a Hammett constant ( $\sigma_p$ ) value of at least equal to 0.2. Claim 15 clearly defines the exact nature of the reactants used in the process, the required steps, and the product produced by the process. Therefore, Claim 15 reasonably conveys to one of ordinary skill in the art that the inventor, at the time the application was filed, had possession of the claimed invention.

Applicants therefore request the withdrawal of this rejection.

**35 U.S.C. §112 second paragraph**

Claims 15-26 been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

The Office Action indicates that Claims 15 and 22 recite the term "equivalents" and it is unclear what unit the equivalents are being measured in.

The term "equivalents" is a term of art in the general field of chemistry. Below is a portion of description of "equivalent" as found at: [http://en.wikipedia.org/wiki/Equivalent\\_\(chemistry\)](http://en.wikipedia.org/wiki/Equivalent_(chemistry)).

**Equivalent (chemistry)**

The *equivalent* (Eq or eq) is a reasonably common measurement unit used in chemistry and the biological sciences. It is a measure of a substance's ability to combine with other substances. It is frequently used in the context of normality.

The equivalent is formally defined as the amount of a substance (moles) which will react with  $6.022 \times 10^{23}$  electrons. (This is Avogadro's Number, which is the number of particles in a mole).

Another, slightly less precise, definition describes the equivalent as the number of grams of a substance that will react with a gram of free hydrogen. (This is *practically* true, since a gram of hydrogen is very close to a mole of hydrogen, and free hydrogen has one spare electron; hence one gram of hydrogen is effectively equivalent to  $6.022 \times 10^{23}$  electrons.)

Hence, the amount of a given substance in equivalents is equal to the amount of the substance in moles multiplied by the valence of the substance. For example, one mole of a divalent substance, such as oxygen, would equal 2 Eq.

Note that the equivalent weight is the mass of one equivalent of a substance.

In practice, the amount of a substance in equivalents often has a very small magnitude, so it is frequently described in terms of milliequivalents (mEq or meq) -- the prefix milli denoting that the measure is divided by 1000. Very often, the measure is used in terms of milliequivalents of solute per litre of solvent (or milliNormal) ( (mEq/l = mN). This is especially common for

measurement of compounds in biological fluids; for instance, the healthy level of potassium in the blood of a human is defined between 3.5 and 5.0 mEq/l.

Equivalents have advantage over moles in quantitative analysis of reactions. The best feature of using equivalents is that there is no need to study much about the nature of reaction, i.e. no need to analyse and balance chemical equations. Equivalents of reactants react in equal numbers to yield the equal equivalents of products.

### Conversion guide

- For monovalent ions, 1 equivalent = 1 mole
- For divalent ions, 1 mol = 2 Eq
- For trivalent ions, 1 mol = 3 Eq

In addition the following excerpt from Chemistry, The Central Science by Brown and LeMay (Fourth ed.), page 385 shows that this term is commonly used in the art.

The concentration units that we have just discussed appear throughout the rest of this chapter and elsewhere in this text. However, one further concentration expression, called **normality**, may be encountered in other places. Normality (abbreviated *N*) is defined as the number of equivalents of solute per liter of solution.

$$\text{Normality} = \frac{\text{equivalents solute}}{\text{liters soln}} \quad [12.5]$$

An equivalent is defined according to the type of reaction being examined. For acid-base reactions, an equivalent of an acid is the quantity that supplies 1 mol of  $\text{H}^+$ ; an equivalent of a base is the quantity reacting with 1 mol of  $\text{H}^+$ . In an oxidation-reduction reaction, an equivalent is the quantity of substance that gains or loses 1 mol of electrons. The masses of 1 equivalent of several substances are given in Table 12.2. An equivalent is always defined in such a way that 1 equivalent of reagent A will react with 1 equivalent of reagent B. For example, in an oxidation-reduction reaction, 31.6 g (1 equivalent) of  $\text{KMnO}_4$  will react with 67.0 g (1 equivalent) of  $\text{Na}_2\text{Cr}_2\text{O}_7$  (refer to Table 12.2). Similarly, in an acid-base reaction, 49.0 g of  $\text{H}_2\text{SO}_4$  (1 equivalent) is stoichiometrically equivalent to 26.0 g of  $\text{Al}(\text{OH})_3$  (1 equivalent).

If  $\text{KMnO}_4$  is reduced to  $\text{Mn}^{2+}$ , thereby gaining five electrons, we have

$$1 \text{ mol } \text{KMnO}_4 = 5 \text{ equivalents of } \text{KMnO}_4$$

TABLE 12.2 Equivalent-mass relationships

Reactant	Product	Reaction type	Mass of 1 mol of reactant (g)	Mass of 1 equivalent of reactant (g)
$\text{KMnO}_4$	$\text{Mn}^{2+}$	Reduction (5 e <sup>-</sup> )	158.0	$158.0/5 = 31.6$
$\text{KMnO}_4$	$\text{MnO}_2$	Reduction (3 e <sup>-</sup> )	158.0	$158.0/3 = 52.7$
$\text{Na}_2\text{Cr}_2\text{O}_7$	$\text{Cr}^{2+}$	Oxidation (2 e <sup>-</sup> )	131.0	$131.0/2 = 65.5$
$\text{H}_2\text{SO}_4$	$\text{SO}_4^{2-}$	Acid (2 $\text{H}^+$ )	98.0	$98.0/2 = 49.0$
$\text{Al}(\text{OH})_3$	$\text{Al}^{3+}$	Base (3 $\text{OH}^-$ )	78.0	$78.0/3 = 26.0$

This demonstrates that the term "equivalents" is a unit that is commonly recognize in the art. The specification teaches the reason why the amount of thiolate is expressed in equivalents. (see page 4, line 31 - page 5, line 4.)

Claim 15 recites, in relevant part:

with a ratio of the amount, in equivalents, of the alkyl sulfide to the amount, in moles, of water being at most equal to 50.

Claim 22 recites, in relevant part:

the ratio of the water, expressed in moles, to the cation, expressed in equivalents, is at least equal to 4.

Claims 15 and 22 each particularly point out and distinctly claim the subject matter which the applicant regards as the invention because both portions of the ratio are clearly defined to one of ordinary skill in the art. Applicants therefore request the withdrawal of this rejection.

Claim 15 has been rejected for reciting "said aqueous phase" in step b. The Office Action indicates that there is insufficient antecedent basis for this limitation.

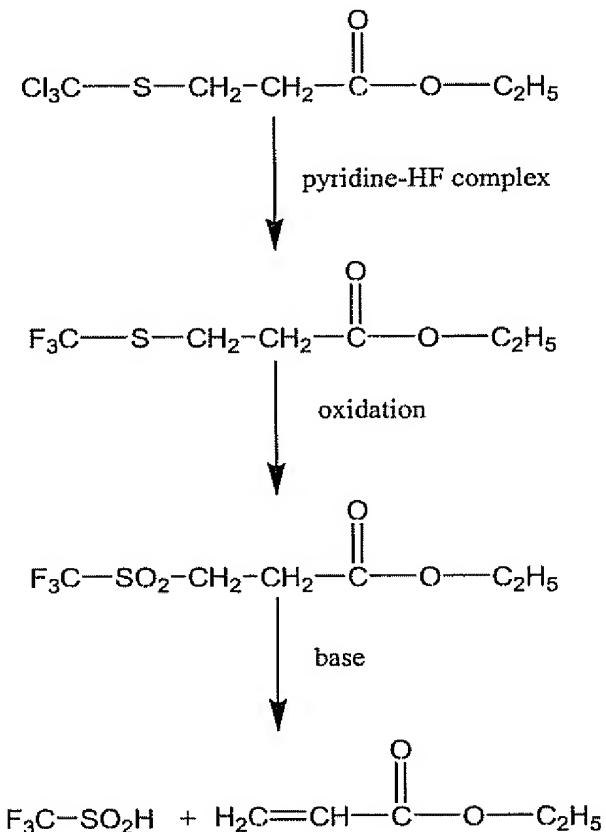
Claim 15 has been amended to correct a typographical error which inadvertently combined the description of the solvent used in step a) with the recitation of step b). The previous version of Claim 15 had the description of the solvent in a separate paragraph after the recitation of step b. Applicants therefore request the withdrawal of this rejection.

**35 U.S.C. §102 prior art rejections**

Claims 15-26 have been rejected under 35 U.S.C. §102(b) as being anticipated by Janin et al. (US 6,316,636).

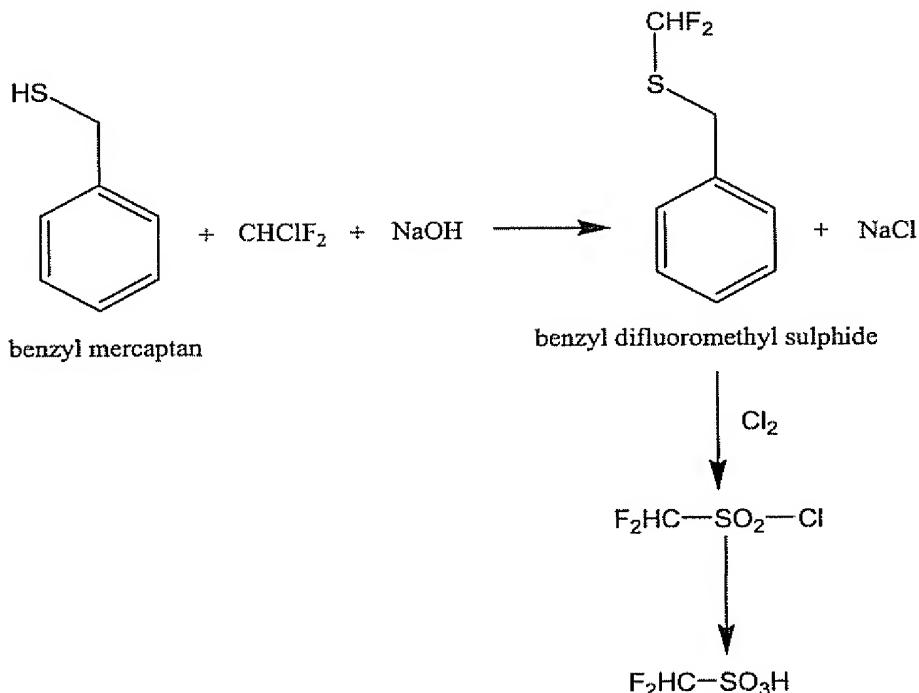
"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (MPEP 2131).

Janin discloses a process for synthesizing fluorocarbon compounds using a Bronstedt base complexed with a defined amount of hydrofluoric acid. Example 4 of Janin is an exemplary reaction that will be compared below to the process of the claims of the instant application.



The first step in the process of Janin is a fluorination reaction, where fluorine is exchanged with chlorine using a Bornstedt base complexed with hydrofluoric acid.

The process described in the instant claimed invention is shown in the example below.



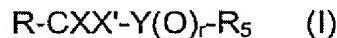
Step a) in Claim 15 of the instant application is not anticipated by Janin because Janin does not disclose reacting (1) an alkyl thiolate and an associated cation with (2) a compound exhibiting a carbon of  $sp^3$  hybridization carrying a hydrogen, a fluorine, a heavy halogen selected from the group consisting of chlorine, bromine and iodine, and an electron-withdrawing group which is fluorine or a group having a Hammett constant ( $\sigma_p$ ) value of at least equal to 0.2.

The Office Action states:

Janin et al. teaches a hydrofluoromethylenesulfonyl radical in column 5, line 7, when it discloses a hydrocarbonylchalcogenyl group and further in line 18, a hydrocarbon radical. This anticipates instant claim 15, and the hydrofluoromethylenesulfonyl radical as claimed. The -fluoro limitation of the instant application is inherent in '636 as the patent is drawn to fluorocarbon compounds. Additionally, in column 1, line 55, '636 discloses that "it is desired to obtain derivatives fluorinated on a

carbon atom of an alkyl radical rendered electron deficient by the presence of electron-withdrawing groups."

Janin discloses the structure of a "suitable substrate", a reactant in their process, having the structure of formula (I):



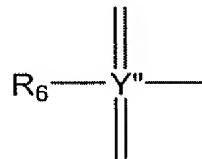
where X and X' are halogens.

Janin discloses in lines 6-7 that R can be a hydrocarbonylchalcogenyl group, such as an alkoxy or aryloxy group. Janin further discloses in line 18 that "R<sub>5</sub> is any radical, advantageously a hydrocarbon radical."

A hydrofluoromethylenesulfonyl radical is not a hydrocarbonylchalcogenyl group as indicated in the Office Action. Janin defines a hydrocarbonylchalcogenyl radical as:

a radical of the structure R<sub>6</sub>-Y"-, wherein R<sub>6</sub> - is a hydrocarbon radical, i.e., a radical containing at least hydrogen and carbon and in which the atom from which the bond depends (here with Y") is a carbon atom, and wherein Y" is a chalcogen (oxygen, sulfur, selenium or tellurium). (col. 10, lines 59-64)

A hydrofluoromethylenesulfonyl radical is not a hydrocarbonylchalcogenyl group because the hydrofluoromethylenesulfonyl radical would be represented by:

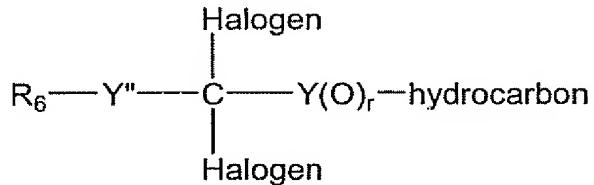


and not by



as recited in Janin. Janin cites alkoxy or aryloxy radicals as the examples of such a group. Therefore the cited reference to line 7 cannot anticipate the hydrofluoromethylenesulfonyl radical in Claim 15 of the instant application.

With regard to the reference of a hydrocarbon radical in line 18, such a disclosure results in a structure having the general formula:



Assuming, for the sake of argument only, that R<sub>6</sub>-Y" is a hydrofluoromethylenesulfonyl radical, such a compound cannot be used as a reactant in the instant application, as this compound is not an alkyl thiolate or a compound exhibiting a carbon of sp<sup>3</sup> hybridization carrying a hydrogen, a fluorine, a heavy halogen, selected from the group consisting of chlorine, bromine and iodine, and an electron-withdrawing group which is fluorine or a group having a Hammett constant ( $\sigma_p$ ) value of at least equal to 0.2.

Therefore the cited reference in the Office Action cannot describe either of the two required reactants in step a) of Claim 15. Therefore, step a) in Claim 15 is not anticipated by Jenin as alleged in the Office Action.

The previous version of Claim 15 recited "condensing" rather than "reacting." One of ordinary skill in the art would recognize that the "condensing an alkyl thiolate with a compound" having the recited properties describes a "condensation reaction", which is known to one of ordinary skill in the art as:

a chemical reaction in which two molecules or moieties (functional groups) combine to form one single molecule, together with the loss of a small molecule.  
(see [http://en.wikipedia.org/wiki/Condensation\\_reaction](http://en.wikipedia.org/wiki/Condensation_reaction))

With regard to the first step in the process, the Office Action states (page 6):

The condensation of an alkyl (cation) thiolate (anion) in a solvent is exemplified in column 14, line 33, "The organic phase was washed... [with] water and dried over magnesium sulfate. The solvent was evaporated off to provide 68g of sulfide which could be purified by distillation. [Distillation and purification are commonly known to be synonymous with condensation.]

This cited portion of Janin does not describe step a) of Claim 15 of the instant application. Janin does not disclose reacting an alkyl thiolate with a compound exhibiting a carbon of  $sp^3$  hybridization carrying a hydrogen, a fluorine, a heavy halogen, selected from the group consisting of chlorine, bromine and iodine, and an electron-withdrawing group which is fluorine or a group having a Hammett constant ( $\sigma_p$ ) value of at least equal to 0.2. Therefore the cited reference in the Office Action cannot describe either of the two required reactants in step a) of Claim 15.

Applicants therefore request the withdrawal of this rejection.

In the event that there are any questions related to this response, or the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney at the below-listed telephone number concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

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Date: November 3, 2008

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